# A CONTRIBUTION TO OUR KNOWLEDGE OF THE PYRENOMYCETES OF PORTO RICO

CARLOS E. CHARDON

[Reprinted from MYCOLOGIA, Vol. XIII, No. 6, November, 1921.]

Reprinted from MYCOLOGIA, Vol. XIII., No. 6, November, 1921 ]

# A CONTRIBUTION TO OUR KNOWLEDGE OF THE PYRENOMYCETES OF PORTO RICO[1]

CARLOS E. CHARDON

(WITH PLATES 13–15, AND TEXT FIGURES 1–4)

The study of the fungous flora of Porto Rico has received in recent years considerable attention from American mycologists. Their enthusiasm has been stimulated by the extensive collections made by Stevens, Fink, Whetzel and Olive, and has led to the publication of a series of papers which give us some conception of the richness of the mycological flora of the island. These studies are of importance, since they represent the first attempt on the part of American mycologists to gain a clearer knowledge of the fungi of the West Indies. A fairly complete account of the Uredinales has been presented in the publications of Arthur (2, 3) and Whetzel and Olive (22), but our knowledge of the pyrenomycetes is still far from perfect in spite of the numerous papers which have appeared dealing with the members of this group.

Klotzch and Sintenis seem to have been the first botanists to collect these fungi on the island and a list of their collections has appeared in literature (18, 26). Heller, in 1900, collected in quantity members of the group and distributed them in his Plants of Porto Rico. His specimens were studied by Earle, who published on them two papers (7, 8), which were the first contributions of importance. A number of years followed in which no

1 Also presented to the Faculty of the Graduate School of Cornell University as a major thesis in partial fulfillment of the requirements for the degree of Master of Science.

[MYCOLOGIA for July–September (13: 201–277) was issued October 8, 1921]

further progress was made, but in 1913 a very active phase of the work was initiated by Stevens and has steadily progressed up to the present time. During 1913–15 Stevens made extensive collections of fungi and accumulated a large amount of material which is deposited at the herbarium of the University of Illinois. He has studied his collection in collaboration with some of his students, and they have published a number of papers on the pyrenomycetes (16, 21, 28, 29, 30, 31, 32, 33, 34, 35) in which a great number of new species have been described. Whetzel and Olive spent the spring of 1916 in the island collecting rusts and other parasitic fungi. A few of the pyrenomycetes of their collections have been described by Fitzpatrick (13, 14) and Seaver (25), and recently a list of all of them was published by the writer (6). A third extensive collection, consisting chiefly of lichens and ascomycetes, was made by Fink in the winter of 1915–16, but nothing has been published on it, excepting a preliminary note by him (12). However, a set of his collections has been sent to the writer, and a further study of them will certainly disclose a number of interesting forms. The pathologists at the Insular Experiment Station at Rio Piedras, P. R., have given a generous part of their time to the collection of fungi and their specimens are deposited at the Station Herbarium. A number of their pyrenomycetes have been sent to Seaver for identification.

Stevenson's "Check List of Porto Rican Fungi" (36), which is a compilation of all the species previously reported and widely scattered in literature, appeared in 1918. It constitutes a starting point for the study of the fungous flora of the island. This paper is rapidly going out of date, however, and the necessity for its revision is felt.

The writer, having become interested in the study of the pyrenomycetes, spent the summer of 1920 in the island collecting intensively on this group. Also the collections of Whetzel and Olive, Stevens, Fink and those of the Insular Experiment Station have been available to him. A close study of these has brought out a sufficient number of interesting facts to warrant the publication of this paper. It represents an attempt toward a more complete understanding of the insular forms of the group.

The writer wishes especially to acknowledge his obligation to Doctor F. J. Seaver and Doctor W. A. Murrill of the New York Botanical Garden for their courtesy and kindness during two brief visits there; to Mr. E. D. Colón, Director of the Insular Experiment Station, and to Mr. J. Matz and Mr. B. López, of the Plant Pathology staff, for their coöperation in connection with this work; to Doctor B. Fink, of Miami University, for having generously sent a set of his collections to the writer; to Doctor F. L. Stevens, of Illinois University, and Doctor C. R. Orton, of Pennsylvania State College, for courteous advice in correspondence. Thanks are due also to Doctor C. Ferdinandsen and Doctor C. Christendsen, of the University of Copenhagen, Denmark; to Doctor L. Romell, of the Royal Museum at Stockholm, Sweden, and to Doctor C. Spegazzini, of LaPlata, Argentine, for having supplied the writer with portions of type materials for examination in connection with this work. Finally, an expression of appreciation is due to Professor H. H. Whetzel, of the Department of Plant Pathology, Cornell University, for placing at the writer's disposal all of his collections, and to Professor H. M. Fitzpatrick, of the same department, under whose supervision the work has been conducted, for valuable suggestions and coöperation, and for the revision and correction of the manuscript. Thanks are also due to Mr. W. R. Fisher for the care taken in the preparation of the photographs which illustrate this paper.

## PERISPORIALES

### MICROTHYRIACEAE

### *Lembosia* Lév.

This genus founded by Léveillé (19) was based on four species: *Lembosia tenella, L. macula, L. Drymidis* and *L. Dendrochili.* Theissen (37) in his recent monograph considers *L. tenella* as the type of the genus and creates a number of additional genera, retaining in the old genus *Lembosia* only those forms having a superficial mycelium and paraphyses. He has reduced to synonymy two Porto Rican species described by Earle (7, 8). It is in the sense of Theissen that the genus is considered here.

The affinities of the genus are not well understood. Saccardo (23), Lindau (20) and Ellis and Everhart (9) have placed it in the Hysteriaceae, while Spegazzini (27) included it in the Hemihysteriaceae. Gaillard (15) first threw light on its real affinities. He shows that the formation of perithecia takes place very much as in *Asterina* and suggests that the genus be incorporated in the Microthyriaceae. Theissen and Sydow (40) definitely include it under that family.

KEY TO PORTO RICAN SPECIES

| | |
|---|---|
| A. Colonies inconspicuous; spores small, 8–11 μ long. | *L. microspora* |
| B. Colonies very conspicuous, spores larger. | |
| 1. Spores 28–35 μ long. | *L. melastomatum* |
| 2. Spores 16–20 μ long. | |
| a. Hyphopodia present; on *Coccoloba*. | *L. tenella* |
| b. Hyphopodia absent; on *Agave*. | *L. Dendrochili* |

**Lembosia microspora** sp. nov.

Colonies inconspicuous; mycelium very sparse, widely effused, hyphae septate at regular intervals, brown, 3–4 μ in diam., occasionally branched and anastomosing; hyphopodia absent; ascomata epiphyllous, scattered, black, very rarely confluent, linear, straight or more often curved, ends obtuse, 250–750 x 100–180 μ, in rare cases exceeding 1 mm. in length; asci ellipsoidal to subglobose, 8-spored, 19–23 x 10–13 μ; spores inordinate, rather unequally septate, hyaline, becoming dark brown at maturity, 8–11 x 4–5 μ; paraphyses inconspicuous (figs. 1–3).

Differs from all other known species of *Lembosia* in the small size of the spores. Another prominent feature is the inconspicuous character of the colonies due to the very scant development of mycelium.

MATERIAL EXAMINED:

On *Ocotea leucoxylon* (Sw.) Mez. (with an undetermined microthyriaceous form on the under surface of the leaf). Cornell University Explorations of Porto Rico (Whetzel & Olive), No. 621, Maricao, Mar. 16, 1916 (*type*).

LEMBOSIA MELASTOMATUM Mont., Pl. Cellul. Cent. VII: 373.

*Lembosia diffusa* Winter Hedwigia 24: 30. 1885.

The Porto Rican collections of this form have all been reported

as *L. diffusa*. The spore measurements given by different authorities vary. Ours, 26–33 x 11–14 μ, seem to agree with those of Arnaud (1) (figs. 4–6).

MATERIAL EXAMINED:

On *Miconia prasina* (Sw.) DC. Porto Rican fungi (Fink), No. 587, Rio Piedras, Dec. 2, 1915; Cornell University Explorations of Porto Rico (Whetzel & Olive), No. 665, Maricao, Mar. 23, 1916.

LEMBOSIA TENELLA Léveillé, Ann. Sci. Nat. III (Bot.) 3: 58. 1845.

*Lembosia Coccolobae* Earle, N. Y. Bot. Gard. Bul. 3: 301, 302. 1903.

Theissen (37) has examined a portion of Earle's type and says: "Nach dem Blatt zu urteilen, ist die Matrix genau derselbe wie die Nicaragua-Exemplar von *Lembosia tenella;* der Pilz ist derselbe, die Art also synosym mit der von uns adoptierten Form von tenella" (figs. 7–8).

The species seems to be of common occurrence. It is unique in being able to withstand the most xerophytic conditions. The spores measure 15–21 x 6–7 μ.

MATERIAL EXAMINED:

On *Coccoloba uvifera* (L.) Jacq. Plants of Porto Rico (Heller), No. 6375, Santurce, Jan. 7, 1903 (*type*); Cornell University Explorations of Porto Rico (Whetzel & Olive), Nos. 522, 523, Mayaguez, Mar. 3, 1916; id. id. (Chardon), No. 836, Ponce, Sept. 6, 1920.

LEMBOSIA DENDROCHILI Léveillé, Ann. Sci. Nat. III (Bot.) 3: 59. 1845.

*Lembosia Agaves* Earle, Muhlenbergia 1: 15. 1900.

A characteristic species on account of its numerous black spots, which are slightly elevated. Earle's material is not fully matured, and he gives the spore measurements as 14–16 x 6–7 μ. Ferdinandsen and Winge (11) examined ripe material from Trinidad

and found the spores to measure 17–20 x 7–9 μ. The material collected by the writer does not show spores, but it is undoubtedly this species. Thiessen considers Earle's species to be identical with *L. Dendrochili.*

MATERIAL EXAMINED:

On *Agave* sp. Plants of Porto Rico (Heller), No. 4429, Cabo Rojo, Jan. 29, 1900 (*type*); Cornell University Explorations of Porto Rico (Chardon), No. 837, Penuelas, July 20, 1920.

## HYPOCREALES

The system of Seaver (24) will be followed in this order.

### NECTRIACEAE

HYPONECTRIA PHASEOLI Stevens, Bot. Gaz. **70**: 401. 1920.

*Phyllachora Phaseoli* P. Henn, *in* Chardon Mycol. **12**: 320. 1920.

The collection of this fungus previously reported by the writer as *Phyllachora* agrees perfectly with the description of Stevens's species.

MATERIAL EXAMINED:

On *Phaseolus adenanthus* Meyer. Cornell University Explorations of Porto Rico (Whetzel & Olive), No. 659, Tamana River, Apr. 7, 1916.

CREONECTRIA OCHROLEUCA (Schw.) Seaver, Mycol. **1**: 190. 1909.

? *Creonectria grammicospora* (Ferd. & Wge.) Seaver, *in* Chardon Mycol. **12**: 319. 1920.

This species resembles *Creonectria Bainii* (Massee) Seaver in perithecial, ascus and spore characters; it differs in that the perithecia are flesh colored when young. The color soon changes to light yellow, and then it becomes impossible to tell the two apart. *Creonectria grammicospora* (F. & W.) Seaver is probably identical with *Creo. ochroleuca,* or represents a variety of it, but definite action in regard to this point can not be taken until the type materials of both species have been examined.

MATERIAL EXAMINED:

On dead bark and twigs. Porto Rican Fungi (Fink), No. 1135, Mayaguez, Dec. 21, 1915; Cornell University Explorations of Porto Rico (Whetzel & Olive), Maricao, Mar. 23, 1916, deposited in Chardon herbarium as No. 742; id. id. (Chardon), No. 888, Penuelas, July 20, 1920.

CREONECTRIA RUBICARPA (Cooke) Seaver, Mycol. 1: 187. 1909.

*Nectria rubicarpa* Cooke, Grevillea 7: 50. 1878.

The material examined, although scant, seems to agree with this species except in one character: the arrangement of the perithecia in cespitose clusters is not pronounced. Most of them are gregarious. The spores measure 10.5–12 x 5–6 $\mu$.

MATERIAL EXAMINED:

On a log. Porto Rican Fungi (Fink), No. 215, Rio Piedras, Jan. 18, 1916; Cornell University Explorations of Porto Rico (Chardon), No. 889, Mayaguez, July 14, 1920.

**Ophionectria portoricensis** sp. nov.

Perithecia densely gregarious, cylindrical to subconical, slightly tapering above, 500–800 $\mu$ high, 250 $\mu$ in lateral diameter, scarlet, covered irregularly with a mealy substance which gives a warty appearance, naked toward the apex, possessing a distinct ostiolum, 15 $\mu$ in diam.; asci subcylindrical, tapering above and below, 217–274 x 22.5–28 $\mu$, 8-spored, the ascus wall evanescent; spores filiform, curved, slightly tapering toward each end, contents hyaline and granular, 13–27 septate, 153–221 x 6–7.5 $\mu$; paraphyses indistinct.

A very distinct and characteristic species on account of the unusually large spores and asci (fig. 10).

MATERIAL EXAMINED:

On a log. Cornell University Explorations of Porto Rico (Whetzel & Olive), Mayaguez, Mar. 13, 1916, deposited in Cornell University Department of Plant Pathology herbarium as No. 11129 (*type*).

HYPOCREACEAE

**Podostroma orbiculare** sp. nov.

Stromata stipitate or substipitate, orbicular, convex, yellowish brown, white and woody within, 4–6 mm. in diam., 2–3.5 mm. high, the surface minutely rugulose from the slightly protruding ostiola; stem stout, short, not exceeding 2 mm. in diam.; perithecia entirely immersed in the stroma, 120–180 $\mu$ in diam.; asci cylindrical, 50–60 x 4 $\mu$, becoming 16-spored at maturity; spores subglobose, hyaline, 2.5 x 3 $\mu$; paraphyses present (fig. 11).

This beautiful species is unique in having a woody stroma instead of the fleshy or subfleshy stroma common to this and other allied genera. It is placed in *Podostroma* rather than in *Hypocrea,* since the stroma is stipitate.

MATERIAL EXAMINED:

On a decaying log. Porto Rican Fungi (Fink), No. 239, Mayaguez, Dec. 17, 1915 (*type*).

STILBOCREA HYPOCREOIDES (Kalch. & Cooke) Seaver, Mycol. 2: 62. 1910.

? *Stilbocrea intermedia* Ferd. & Wge., Bot. Tidsk. 29: 12. 1908.

This species is very closely related to *S. intermedia,* from which it can, in fact, hardly be distinguished. Seaver (24) separates the two forms on the basis of spore measurements, but the difference is so slight as to raise the question whether the two may not be identical.

MATERIAL EXAMINED:

On bark and decaying wood. Herbarium Insular Experiment Station (Stevenson), No. 2390, Rio Piedras, Nov. 29, 1914; Cornell University Explorations of Porto Rico (Chardon), No. 1237, Mayaguez, July 14, 1920.

*Dothichloe* Atk.

This genus comprises a few forms parasitic on grasses. It was erected by Atkinson (4, 5) to include those species of *Hypocrella* possessing a dothideaceous stroma like *Dothichloe atramentosa* (B. & C.) Atk.

The systematic position of the genus is not definitely established. It is included in the Hypocreales by Seaver (24) as a synonym of *Balansia*. Since Seaver does not discuss any of the species of *Dothichloe* under *Balansia*, there appears to be no justification for this. *Dothichloe* is distinct from *Balansia* in not possessing a pseudosclerotium made up of a mixture of host and fungous tissue. Theissen and Sydow (39) exclude the genus from the Dothideales and regard it as identical with *Ophiodothis*. Stevens in his "Fungi Which Cause Plant Disease" assigns it a definite place in the Hypocreales, placing it next to *Balansia*. The writer has examined a set of prepared slides made from the type specimen of *Hypocrea atramentosa* B. & C. which are deposited in the Atkinson herbarium at Cornell University. The stroma is evidently dothideaceous and no evidence of a perithecial wall is present. However, in their filiform spores and in certain other minor characters the species show marked resemblance with those of *Balansia*, *Epichloe* and *Hypocrella*, and thus a relationship with the Hypocreaceae is strongly suggested.

KEY TO PORTO RICAN SPECIES

A. Stromata distinct, subglobose, located below the nodes of the host. *D. subnodosa*

B. Stromata broadly effused.

1. Stromata completely encircling the culms. *D. Aristidae*
2. Stromata borne on the leaf and occupying only one side. *D. atramentosa*

**Dothichloe subnodosa** sp. nov.

*Balansia subnodosa* Atk., in mss.

*Dothichloe nigricans* (Speg.) Seaver, *in* Stevenson, Jour. Dept. Agr. Porto Rico 2: 151. 1918.

Stromata subglobose, slightly flattened, located just beneath the nodes on the culms of the host, partially or in rare cases entirely surrounding the host, black, brown or yellowish within, not united with the host elements, 1–3 mm. in diam., with the surface rugulose from the papillate ostiola; locules immersed, flask-shaped, 125–150 x 150–200 $\mu$; asci narrowly cylindrical, tipped with a globose "cap cell," 150–180 x 3–4.5 $\mu$, 8-spored; spores filiform, nearly as long as the asci, approximately 1 $\mu$ broad, fragmenting at maturity; paraphyses present (fig. 14).

This fungus is clearly different from *Epichloe* ? *nigricans* Speg., which has stromata 5–10 mm. long. Atkinson worked with one of Stevens's collections of this form and labeled it in his herbarium

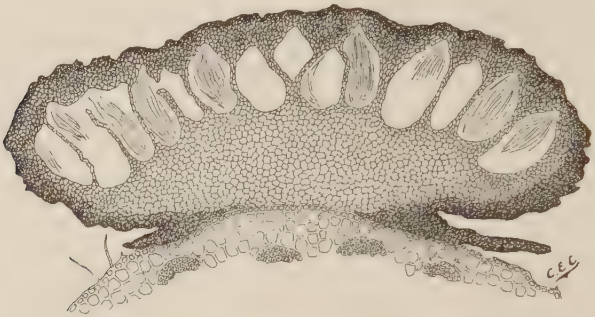


FIG. 1. *Dothichloe subnodosa* sp. nov. Cross section of a stroma showing the sharp definition between the host and fungous tissue. (Outlined with a camera lucida; × 50).

as "*Balansia subnodosa* sp. nov." He apparently, however, never published it. The writer feels that the species should be transferred to *Dothichloe* on account of the absence of the intimate fusion of fungous and host tissue, pseudosclerotium, characteristic of *Balansia.*

MATERIAL EXAMINED:

On *Ichnanthus pallens* Munro. Cornell University Explorations of Porto Rico (Whetzel & Olive), No. 690, Mayaguez, Mar. 6, 1916 (*type*); id. id. (Whetzel & Olive), No. 689, Mayaguez, Mar. 2, 1916; id. id. (Whetzel & Olive), No. 692, Maricao, Mar. 22, 1916; id. id. (Whetzel & Olive), No. 691, El Yunque, Apr. 22, 1916.

DOTHICHLOE ARISTIDAE Atk., Bul. Torr. Bot. Club **21**: 224. 1894.

Characteristic in that the stroma completely surrounds the culms of the host, as in *Epichloe.* However, the stromata are black and carbonaceous (fig. 13).

MATERIAL EXAMINED:

On *Aristida portoricensis* Pilger. Cornell University Explorations of Porto Rico (Whetzel & Olive), No. 695, Mayaguez, Mar. 7, 1916.

DOTHICHLOE ATRAMENTOSA (B. & C.) Atk., Jour. Mycol. 11: 260. 1905.

*Hypocrea atramentosa* B. & C., Jour. Linn. Soc. 10: 377. 1869.

Stromata 5–15 mm. long, black, carbonaceous, occupying only one side of the leaf. Very distinct from the preceding species (fig. 12).

MATERIAL EXAMINED:

On *Andropogon leucostachys* H. B. K. Herbarium University of Illinois, Porto Rican Fungi (Stevens), No. 8211, Las Marias, July 10, 1915.

On *Chloris petraea* Sw. Cornell University Explorations of Porto Rico (Whetzel & Olive), Nos. 694, 694*a*, Boqueron, Mar. 11, 1916.

## DOTHIDEALES

The system of Theissen and Sydow (39) will be followed here in its entirety.

### DOTHIDEACEAE

**Dothidina peribebuyensis** (Speg.) comb. nov.

*Phyllachora peribebuyensis* Speg., Fung. Guar. 1: 274. 1883.

*Auerswaldia Miconiae* P. Henn., Hedwigia 43: 253. 1904.

*Bagnisiopsis peribebuyensis* (Speg.) Th. & Syd., Ann. Mycol. 13: 292. 1915.

*Dothidina Miconiae* (P. Henn.) Th. & Syd., Ann. Mycol. 13: 298. 1915.

A comparison of the type material of *Phyllachora peribebuyensis* Speg. (Balansa—Plantes du Paraguay No. 3854) and that of *Auerswaldia Miconiae* P. Henn. (Ule—Appendix Mycotheca Brasiliensis No. 27) has shown them to be the same fungus. Theissen and Sydow seem to have overlooked this fact and have proposed new combinations for each, placing them under different genera.

The fungus is by no means a *Phyllachora*. Garman (16) identified the specimens collected by Stevens as *P. peribebuyensis*, but admitted that the species might possibly fall under *Bagnisiopsis*. Working with material from Colombia, H. and P. Sydow (41) also made the mistake of referring the fungus to *P. peribebuyen-*

*sis*. They observed, however, that the spores at maturity turn to a light brown color, which suggested to them the genus *Auerswaldia*. Finally Seaver determined the specimens collected by Whetzel and Olive as *Auerswaldia Miconiae* and the writer (6) published them under that name (fig. 19).

The fungus falls under *Dothidina* in the treatment of Theissen and Sydow on account of the presence of paraphyses. The spores measure 14–18 x 6–7 μ.

MATERIAL EXAMINED:

On *Heterotrichum cymosum* (Wendl.) Urban. Herbarium University of Illinois, Porto Rican Fungi (Stevens), No. 5206, San Sebastian, Nov. 13, 1913; Cornell University Explorations of Porto Rico (Whetzel & Olive), No. 643, El Yunque, Apr. 12, 1916.

On *Miconia laevigata* (L.) DC. Herbarium University of Illinois, Porto Rican Fungi (Stevens), No. 435, El Gigante, Dec. 15, 1913.

On *Miconia prasina* (Sw.) DC. Herbarium Insular Experiment Station (Stevenson), No. 5362, Espinosa, Mar. 27, 1917.

On *Miconia Sintenisii* Cogn. Herbarium University of Illinois, Porto Rican Fungi (Stevens), No. 6656, Santa Ana, Dec. 31, 1913.

On *Miconia* sp. Herbarium Insular Experiment Station (Stevenson), No. 742, Maricao, Mar. 14, 1913; Cornell University Explorations of Porto Rico (Whetzel & Olive), Nos. 696, 697, Maricao, Mar. 22 and 15, 1916, respectively.

On *Tetrazygia elaeagnoides* (Sw.) DC. Cornell University Explorations of Porto Rico (Whetzel & Olive), No. 636, Barceloneta, Apr. 8, 1916.

## PHYLLACHORACEAE

**Trabutia Bucidae** sp. nov.

Spots not exceeding the stromata; stromata numerous, hypophyllous, crowded in irregular areas 5–10 mm. in diam., individual stromata black, shining, approximately circular, often confluent, .5–1.5 mm. in diam., subcuticular; locules globose to oblong, 200–300 x 150–200 μ, covered by a well-developed stroma which often

extends far beyond them; asci very indistinct, clavate cylindrical, 8-spored, 50–64 x 17–24 $\mu$; spores inordinate, continuous, pale yellow, globose to ellipsoidal, 9–12 x 7–8 $\mu$; paraphyses present, profuse (fig. 22).

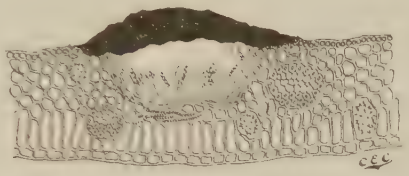


FIG. 2. *Trabutia Bucidae* sp. nov. Cross section of a leaf of *Bucida buceras* showing a locule covered above with a subcuticular stroma. (Outlined with a camera lucida; × 125).

MATERIAL EXAMINED:

On *Bucida buceras* L. Cornell University Explorations of Porto Rico (Chardon), No. 905, Coamo, Aug. 21, 1921 (*type*).

**Trabutia Guazumae** sp. nov.

?*Phyllachora Guazumae* P. Henn., Hedwigia 48: 7. 1908.

Stromata epiphyllous, numerous, black, shining, irregular or occasionally circular, distinctly convex to subconical, 1–2 mm. in diam., in rare cases 3–4 mm., surrounded by a discolored zone of dead host tissue .5 mm. across; locules many, globose, 200–300 $\mu$ in diam.; covered with a well-developed stroma, asci subcylindrical, 63–78 x 13–19 $\mu$; the ascus wall indistinct, spores uniseriate or biseriate in the main body of the ascus, cylindrical, hyaline, continuous, contents uniform when young, becoming distinctly 2-guttulate at maturity; paraphyses present (fig. 20).

FIG. 3. *Trabutia Guazumae* sp. nov. Cross section of a leaf of *Guazuma ulmifolia* showing plurilocular stroma. The stroma is apparently subcuticular. (Outlined with a camera lucida; × 125).

This form is probably cospecific with *Phyllachora Guazumae* described by Hennings from Brazil. Unfortunately, he worked with immature material and his description is very incomplete, the spores not being mentioned. In the system of Theissen and

Sydow the Porto Rican material falls in the genus *Trabutia* on account of the subcuticular stroma.

MATERIAL EXAMINED:

On *Guazuma ulmifolia* Lam. Cornell University Explorations of Porto Rico (Chardon), No. 895, Penuelas, Aug. 11, 1920 (*type*); id. id. (Chardon), No. 921, Penuelas, July 28, 1920.

**Trabutia conica** sp. nov.

Stromata epiphyllous, numerous, shining, black, approximately circular, conical and protruding considerably above the surface of the host, 1–2 mm. in diam., subcuticular (?), surrounded by a slightly discolored zone 1 mm. across, the single ostiolum distinct at the apex of the conical stroma; locule single, 300–700 $\mu$ in diameter, at first bearing a thick layer of filiform, hyaline conidia, 3–4 x 1 $\mu$, later developing the asci; asci narrowly ellipsoidal, 8-spored, 67–81 x 19–23 $\mu$, the ascus wall indistinct, spores biseriate to inordinate, globose, hyaline, continuous, 10 $\mu$ in diam.; paraphyses present (fig. 21).

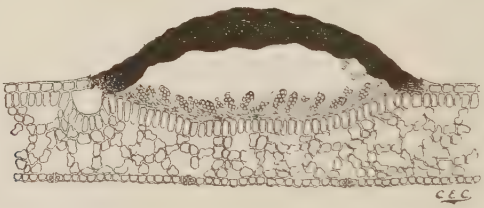


FIG. 4. *Trabutia conica* sp. nov. Cross section of a leaf of *Drepanocarpus lunatus* showing a locule, the subcuticular stroma, asci and ascospores. (Outlined with a camera lucida; × 125).

MATERIAL EXAMINED:

On *Drepanocarpus lunatus* (L. f.) G. Meyer. Cornell University Explorations of Porto Rico (Whetzel & Olive), No. 658, Mayaguez, Mar. 26, 1916 (*type*); id. id. (Whetzel & Olive), No. 634, Martin Pena, Apr. 10, 1916.

*Phyllachora canafistulae* Stevens & Dalbey, Bot. Gaz. 68: 55. 1919.

The description of this fungus by Stevens and Dalbey was based

on a single collection made at Mayaguez on *Cassia fistula*. The writer was fortunate in securing abundant material of the species and, moreover, collecting it on a new host, *Cassia grandis*. *Phyllachora Cassiae* P. Henn. reported from Brazil is very distinct from the Porto Rican species in possessing smaller, unilocular stromata and slightly larger spores. The two collections reported by Stevenson (36) as *P. Cassiae* are here referred to *P. canafistulae* (fig. 23).

MATERIAL EXAMINED:

On *Cassia fistula* L. Herbarium Insular Experiment Station (Stevenson), No. 3564, Rio Piedras, Dec. 14, 1915; Cornell University Explorations of Porto Rico (Chardon), No. 924, Penuelas, July 30, 1920; id. id. (Chardon), No. 926, Penuelas, July 18, 1920.

On *Cassia grandis* L. Cornell University Explorations of Porto Rico (Chardon), No. 900, Penuelas, July 18, 1920; id. id. (Chardon), No. 916, Penuelas, July 24, 1920.

**Phyllachora Serjaniicola** sp. nov.

Spots amphigenous, slightly exceeding the stromata, irregular; stromata small, black, shining, 1–4 mm. in diam., visible on both sides of the leaf, occupying the mesophyll, surrounded by a narrow zone of dead host tissue, plurilocular; locules globose to irregular, 180–300 $\mu$ in diam.; asci cylindrical, 8-spored, 63–75 x 12–18 $\mu$; spores uniseriate or else biseriate at the apex, ellipsoidal, hyaline, continuous, 10–13 x 6–8 $\mu$; paraphyses present (fig. 18).

The species differs from *Phyllachora duplex* Rehm in having smaller spores and much smaller stromata. A portion of Rehm's type was sent by Doctor L. Romell for examination.

MATERIAL EXAMINED:

On *Serjania polyphylla* Radlk. Cornell University Explorations of Porto Rico (Chardon), No. 923, Penuelas, July 27, 1920 (*type*); id. id. (Chardon), No. 896, Penuelas, Aug. 11, 1920.

**Phyllachora Whetzelii** sp. nov.

Spots amphigenous, slightly exceeding the stromata, circular in outline; stromata small, purple-black, dull, circular, 1–1.5 mm. in diam., occupying the mesophyll of the leaf; very conspicuous on

the upper surface, slightly less so on the lower; locules globose, 2–4 in each stroma, 150–250 μ across; asci cylindrical, 87–109 x 8–10.5 μ, 8-spored; spores uniseriate, ellipsoidal, hyaline to yellowish green, continuous, 11.5–13 x 3–4 μ; paraphyses very abundant (fig. 24).

This species possesses some of the characters of *Phyllachora biarcolata* Speg., but, through the courtesy of Doctor C. Spegazzini, it has been possible to examine a portion of the type material of that species, and our form has been found to be very different in stromatal characters.

MATERIAL EXAMINED:

On *Eugenia* sp. Cornell University Explorations of Porto Rico (Whetzel & Olive), No. 571, Barceloneta, Apr. 6, 1916 (*type*).

## SPHAERIALES

### SORDARIACEAE

Only one species belonging to this group of dung-inhabiting forms has been reported from the island. The group is probably well represented, but has apparently been neglected by all collectors. The writer has been fortunate in seeing two collections in excellent condition. Both of them have been identified with the aid of Griffiths's monograph (17).

SORDARIA HUMANA (Fuckel) Awd., Abhand. naturf. Gess. Halle 13: 85. 1873.

Spores obovate, 15–19 x 21–23 μ. According to Griffiths, the shape of the spores is the only character which serves to distinguish this species from *S. fimicola*, the spores of the latter being ellipsoidal.

MATERIAL EXAMINED:

On human dung. Cornell University Explorations of Porto Rico (Whetzel & Olive), Maricao, Mar. 16, 1896, deposited in Chardon herbarium as No. 1351.

PLEURAGE ARACHNOIDEA (Niessl.) D. Griff., Mem. Torr. Bot. Club 11: 73. 1901.

Spores 7–9 x 17–19.5 μ, with a very long primary appendage which curves and overlaps the spore below.

MATERIAL EXAMINED:

On cow dung. Porto Rican Fungi (Fink), No. 1241, Mayaguez, Dec. 3, 1915.

SPHAERIACEAE

HERPOTRICHIA ALBIDOSTOMA (Schw.) Sacc., Syll. Fung. 9: 857. 1891.

There have been thus far only four collections of *Herpotrichia* made from the island: two of them collected by Stevenson and two by the writer. Stevenson (37) refers one of his collections to *H. albidostoma* and the other to *H. diffusa*. All four collections have been examined by the writer and it has become evident that they belong to a single species. This conclusion was reached after measuring accurately 100 spores from each specimen and plotting curves which coincide. A wide range in spore lengths, 26 to 40 $\mu$, was observed. The specimens agree with material collected by Langlois in Louisiana and distributed (Ellis & Everh., Fungi Columbiani, No. 1035) under the name of *Herpotrichia diffusa* var. *rhodomphala*. The Porto Rican material, however, is referred here to *H. albidostoma*, the type of which has been examined at the New York Botanical Garden.

MATERIAL EXAMINED:

On shells and debris of *Cocos nucifera* L. Herbarium Insular Experiment Station (Stevenson), No. 2626, Espinosa, Mar. 6, 1915; Cornell University Explorations of Porto Rico (Chardon), No. 1230, Mayaguez, July 14, 1920.

On decaying wood. Herbarium Insular Experiment Station (Stevenson), No. 5586, Rio Piedras, July 4, 1916; Cornell University Explorations of Porto Rico (Chardon), No. 959, Coamo, Aug. 26, 1920.

XYLARIACEAE

HYPOXYLON ANNULATUM (Schw.) Mont., Syll. Crypt.: 213.

This very common species resembles a *Rosellinia*, since the perithecia are sometimes free. Individual perithecia are large, black and bear the papilliform ostiolum at the center of a small disk (fig. 15).

MATERIAL EXAMINED:

On dead wood. Herbarium Insular Experiment Station (Stevenson), No. 2989, Palo Seco, Apr. 24, 1915; Cornell University Explorations of Porto Rico (Whetzel & Olive), No. 764, Maricao, Mar. 13, 1916; id. id. (Chardon), Nos. 953, 963, Coamo, Aug. 23, 1920; id. id. (Chardon), No. 961, Coamo, Aug. 26, 1920.

NUMMULARIA CINCTA Ferd. & Wge., Bot. Tidsk. 29: 15. 1909.

This form might be confused easily with *N. Bulliardi* in that the stroma is erumpent and pushes the bark to the sides. It differs in that the stroma lacks marked punctulations and is not so characteristically convex (fig. 17).

MATERIAL EXAMINED:

On dead and decaying wood. Herbarium Insular Experiment Station (Stevenson), No. 3464, Rio Piedras, Dec. 12, 1913; id. id. (Johnston & Stevenson), No. 1253, Martin Pena, Jan. 25, 1914; Porto Rican Fungi (Fink), No. 691, Rio Grande, Dec. 7, 1915; Cornell University Explorations of Porto Rico (Chardon), No. 977, Penuelas, July 21, 1920.

The material examined was compared with a fragment of the type kindly supplied by Doctor Ferdinandsen.

NUMMULARIA PUNCTULATA (B. & R.) Sacc., Syll. Fung. 1: 399. 1882.

This is a very common and characteristic species on account of its smooth and polished stromata. The stroma is broadly effused, 3–10 cm. or more in length and projects but slightly above the bark. Most of the collections are sterile (fig. 16).

MATERIAL EXAMINED:

On dead wood. New York Botanical Garden, Explorations of Porto Rico (Schafer), No. 3687, Sierra de Naguabo, Aug. 10–15, 1914; Herbarium University of Illinois, Porto Rican Fungi (Stevens), No. 112, Dos Bocas, July 8, 1915; Porto Rican Fungi (Fink), No. 974, Mayaguez, Dec. 18, 1915; id. id. (Fink), No. 1785, Aibonito, Jan. 3, 1915; Cornell University Explorations of

Porto Rico (Chardon), No. 976, Penuelas, July 28, 1920; id. id. (Chardon), No. 979, Penuelas, Aug. 7, 1920.

NUMMULARIA REPANDA (Fries) Nitsch. Pyren. Germ: 57. 1867.

Very similar in habit to *N. discreta*, but with ellipsoidal spores, 11–13.5 x 4.5–6.5 $\mu$.

MATERIAL EXAMINED:

On dead wood. Herbarium Insular Experiment Station (Johnston), No. 676, El Yunque, Dec. 12, 1912; Cornell University Explorations of Porto Rico (Chardon), No. 981, Coamo, Aug. 27, 1920.

DEPARTMENT OF PLANT PATHOLOGY,
CORNELL UNIVERSITY,
ITHACA, NEW YORK.

LITERATURE CITED

1. **Arnaud, G.** Les Astérinées. Ann. Ecol. Nat. Agr. Montp. **16**: 1–288. *pls. 1–51.* 1918.
2. **Arthur, J. C.** Uredinales of Porto Rico based on collections by F. L. Stevens. Mycol. **7**: 168–196, *227–255*, 315–332. 1915. id. **8**: 16–33. 1916.
3. **Arthur, J. C.** Uredinales of Porto Rico based on collections by H. H. Whetzel and E. W. Olive. Mycol. **9**: 55–104. 1917.
4. **Atkinson, G. F.** Steps toward a revision of the linosporous species of North American graminicolous Hypocreaceae. Bul. Torr. Bot. Club **21**: *222–225*. 1894.
5. **Atkinson, G. F.** The genera *Balansia* and *Dothichloe* in the United States with a consideration of their economic importance. Jour. Mycol **11**: *pls. 81–88*. 1845.
6. **Chardon, C. E.** A list of the Pyrenomycetes of Porto Rico collected by H. H. Whetzel and E. W. Olive. Mycol. **12**: 316–321. 1920.
7. **Earle, F. S.** Some fungi from Porto Rico. Muhlenbergia **1**: 10–23. 1900.
8. **Earle, F. S.** Mycological Notes. II. Bul. N. Y. Bot. Gard. **3**: 289–312. 1913.
9. **Ellis, J. B., and B. M. Everhart.** The North American Pyrenomycetes. 1892.
10. **Ferdinandsen, C., and O. Winge.** Fungi from the Danish West Indies collected by C. Raunkiaer. Bot. Tidsk. **29**: 1–25. *pls. 1–2.* 1909.
11. **Ferdinandsen, C., and O. Winge.** Fungi from Professor Warming's expedition to Venezuela and the West Indies. Bot. Tidsk. **30**: 211. *7 figs.* 1910.
12. **Fink, B.** The distribution of fungi in Porto Rico. Mycol. **10**: 58–61. 1918.

13. **Fitzpatrick, H. M.** *Rostronitschkia,* a new genus of Pyrenomycetes. Mycol. **11**: 163–167. 1919.
14. **Fitzpatrick, H. M.** Monograph of the Coryneliaceae. Mycol. **12**: 206–267. *pls. 12–18.* 1920.
15. **Gaillard, M. A.** Note sur le genre *Lembosia.* Bul. Soc. Myc. France **9**: 122–123. 1893.
16. **Garman, P.** Some Porto Rican parasitic fungi. Mycol. **7**: 333–340. *pl. 171, fig. 1.* 1915.
17. **Griffiths, D.** The North American Sordariaceae. Mem. Torr. Bot. Club **11**: 1–134. *pls. 1–19.* 1901.
18. **Klotzsch, J.** Schwanecke collection of fungi. Linnaea **25**: 364–366. 1852.
19. **Léveillé, M. J. H.** Champignons exotiques. Ann. Sci. Nat. III (Bot.) **3**: 38–71. 1845.
20. **Lindau, G.** Hysteriineae *in* Engler und Prantl "Die Naturliche Pflanzenfamilien" Teil I. abt. **1**: 265–278. 1897.
21. **Miles, L. E.** Some new Porto Rican fungi. Trans. Illinois Acad. Sci. **10**: 249–255. 1917.
22. **Olive, E. W., and H. H. Whetzel.** Endophyllum-like rusts of Porto Rico. Amer. Jour. Bot. **1**: 44–52. *pls. 1–3.* 1917.
23. **Saccardo, P. A.** Sylloge Fungorum **1**. 1882.
24. **Seaver, F. J.** Hypocreales. North Amer. Flora **3**: 1–56. 1910.
25. **Seaver, F. J.** Notes on North American Hypocreales IV. *Aschersonia* and *Hypocrella.* Mycol. **12**: 93–98. *pl. 6.* 1920.
26. **Sintenis, P.** Pilsen auf der insel Portorico 1884–1887 gesammelten. Engler Bot. Jahr. **17**: 489–501. 1893.
27. **Spegazzini, C.** Fungi Guaraniti **1**: 132. 1883.
28. **Stevens, F. L.** The genus *Meliola* in Porto Rico. Illinois Biol. Monog. **2**: 475–553. *pls. 1–5.* 1916.
29. **Stevens, F. L.** Porto Rican fungi, old and new. Trans. Illinois Acad. Sci. **10**: 162–218. 1917.
30. **Stevens, F. L.** Some meliocolous parasites and commensals from Porto Rico. Bot. Gaz. **65**: 227–249. *pls. 5–6, 5 figs.* 1918.
31. **Stevens, F. L.** Dothidiaceous and other Porto Rican fungi. Bot. Gaz. **69**: 248–257. *13–14.* 1920.
32. **Stevens, F. L.** New or noteworthy Porto Rican fungi. Bot. Gaz. **70**: 399–402. *4 figs.* 1920.
33. **Stevens, F. L., and N. Dalbey.** New or noteworthy Porto Rican fungi. Mycol. **11**: 4–9. *pls. 2–3.* 1919.
34. **Stevens, F. L., and N. Dalbey.** Some Phyllachoras from Porto Rico. Bot. Gaz. **68**: 54–59. *pls. 6–8.* 1919.
35. **Stevens, F. L., and N. Dalbey.** A parasite of the tree fern (*Cyathea*). Bot. Gaz. **68**: 222–225. *pls. 15–16.* 1919.
36. **Stevenson, J. A.** A check list of Porto Rican fungi and a host index. Jour. Dept. Agr. P. R. **2**: 125–264. 1918.
37. **Theissen, F.** Lembosia-Studien. Ann. Mycol. **11**: 425–467. *pl. 20.* 1913.
38. **Theissen, F., und N. Sydow.** Dothideazeen-Studien. Ann. Mycol. **12**: 176–194. 1914.

30. **Theissen, F., und H. Sydow.** Die Dothideales. Ann Mycol. 13: 149–746. *pls. 1–6.* 1915.

40. **Theissen, F., und H. Sydow.** Synoptische Tafeln. Ann. Mycol. 15: 389–491. 1917.

41. **Sydow, H. et P.** Contribution à l'étude des champignons parasites de la Colombie in Fuhrmann, O et E. Mayor. Voyage d'exploration scientifique on Colombie. Mem. Soc. Neuch. Sci. Nat. 5: 435. 1913.

## EXPLANATION OF PLATES

### PLATE 13

Fig. 1. *Lembosia microspora* sp. nov. Group of ascomata; notice there is no evidence of a superficial mycelium. × 11.

Fig. 2. *L. microspora.* Two mature asci; notice the small size of the ascospores when compared with those of the other two species. × 300.

Fig. 3. *L. microspora.* Portion of a leaf of *Ocotea leucoxylon* showing groups of ascomata. × 8/11.

Fig. 4. *Lembosia melastomatum* Mont. Colonies on a fragment of a leaf of *Miconia prasina.* × 8/11.

Fig. 5. *L. melastomatum.* Group of ascomata on the same leaf; notice the profuse development of aerial mycelium. × 11.

Fig. 6. *L. melastomatum.* A mature ascus. × 300.

Fig. 7. *Lembosia tenella* Lév. Group of ascomata on a leaf of *Coccoloba uvifera.* × 11.

Fig. 8. *L. tenella.* An ascus with immature ascospores to the left and two mature ascospores to the right. × 300.

Fig. 9. *L. tenella.* Portion of a leaf of *Coccoloba uvifera* showing characteristic colonies. × 8/11.

### PLATE 14

Fig. 10. *Ophionectria portoricensis* sp. nov. A group of perithecia. × 3.

Fig. 11. *Podostroma orbiculare* sp. nov. Two stromata; the one to the left is shown side view and shows the stipitate character. × 3/2.

Fig. 12. *Dothichloe atramentosa* (B. & C.) Atk. Characteristic stromata on leaves of *Chloris petraea.* × 8/11.

Fig. 13. *Dothichloe Aristidae* Atk. Culms of *Aristida portoricensis* with stromata completely encircling them. × 8/11.

Fig. 14. *Dothichloe subnodosa* sp. nov. Stromata on culms of *Ichnanthus pallens;* notice the location of the stromata just beneath the nodes. × 8/11.

Fig. 15. *Hypoxylon annulatum* (Schw.) Mont. Perithecia. × 6.

Fig. 16. *Nummularia punctulata* (B. & R.) Sacc. Stromata on dead wood showing effused character; notice also the smooth polished surface of the stroma. × 8/11.

Fig. 17. *Nummularia cincta* Ferd. & Wge. Stromata on dead wood showing characteristic erumpent habit. × 8/11.

PLATE 15

Fig. 18. *Phyllachora Serjaniicola* sp. nov. Stromata on leaves of *Serjania polyphylla*. × 8/11.

Fig. 19. *Dothidina peribebuyensis* (Speg.) Chardon. Stromata on portion of a leaf of *Miconia* sp. × 8/11.

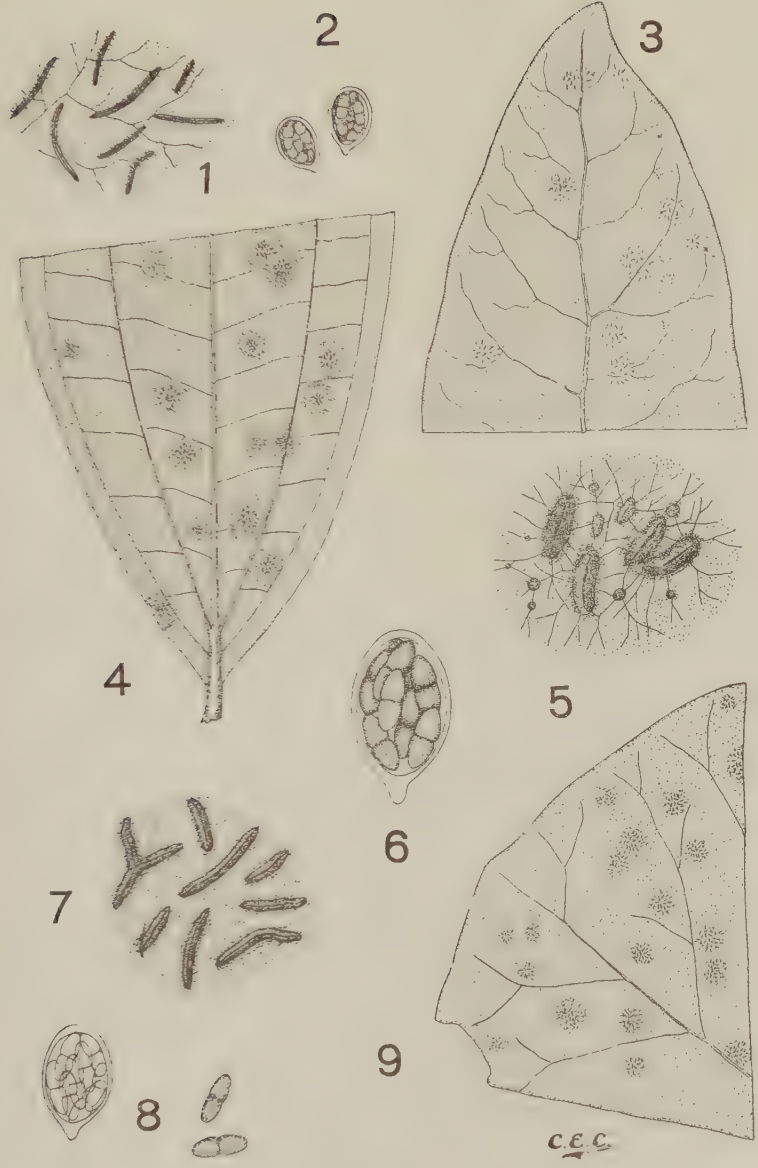
Fig. 20. *Trabutia Guazumae* sp. nov. Fragment of a leaf of *Guazuma ulmifolia* covered with numerous stromata. × 8/11.

Fig. 21. *Trabutia conica* sp. nov. Characteristic stromata on leaves of *Drepanocarpus lunatus*. × 8/11.

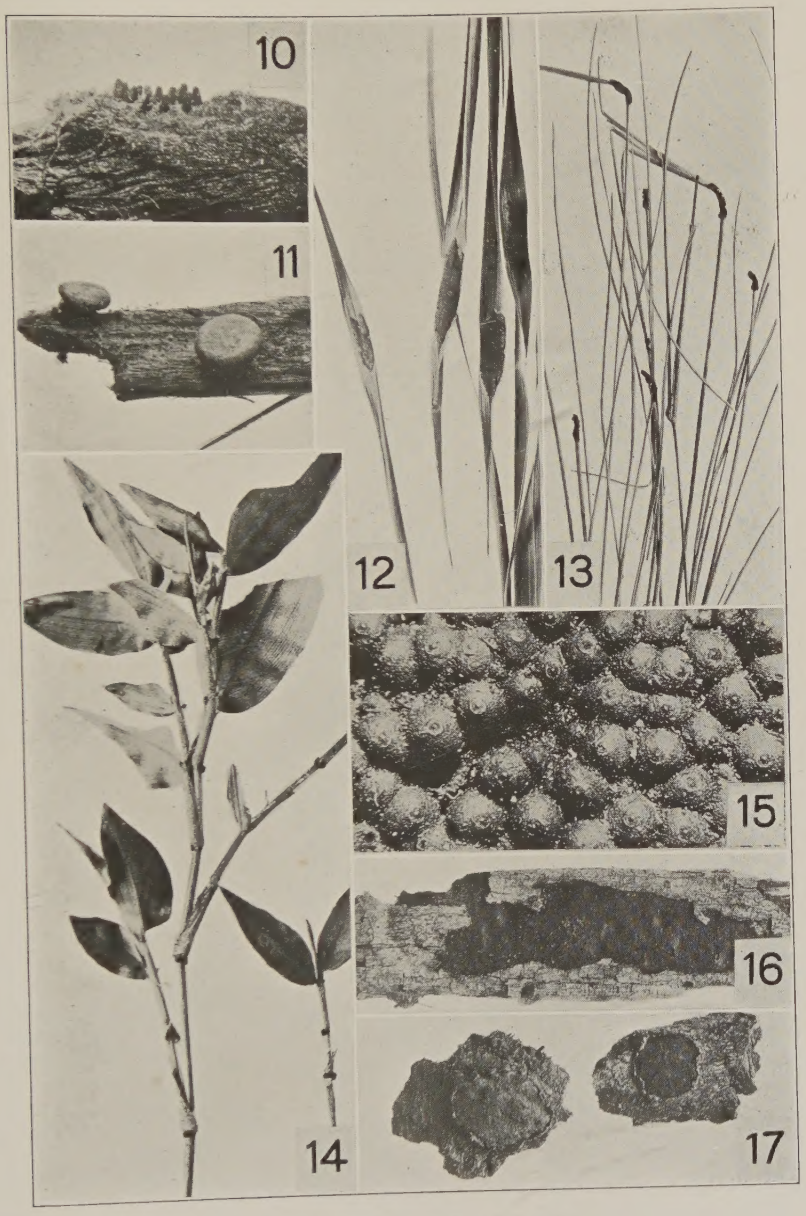
Fig. 22. *Trabutia Bucidae* sp. nov. Leaf of *Bucida buceras* with stromata; notice the stromata have a tendency to crowd themselves in colonies. × 8/11.

Fig. 23. *Phyllachora canafistulae* Stevens & Dalby. Stromata on leaves of *Cassia grandis*. × 8/11.

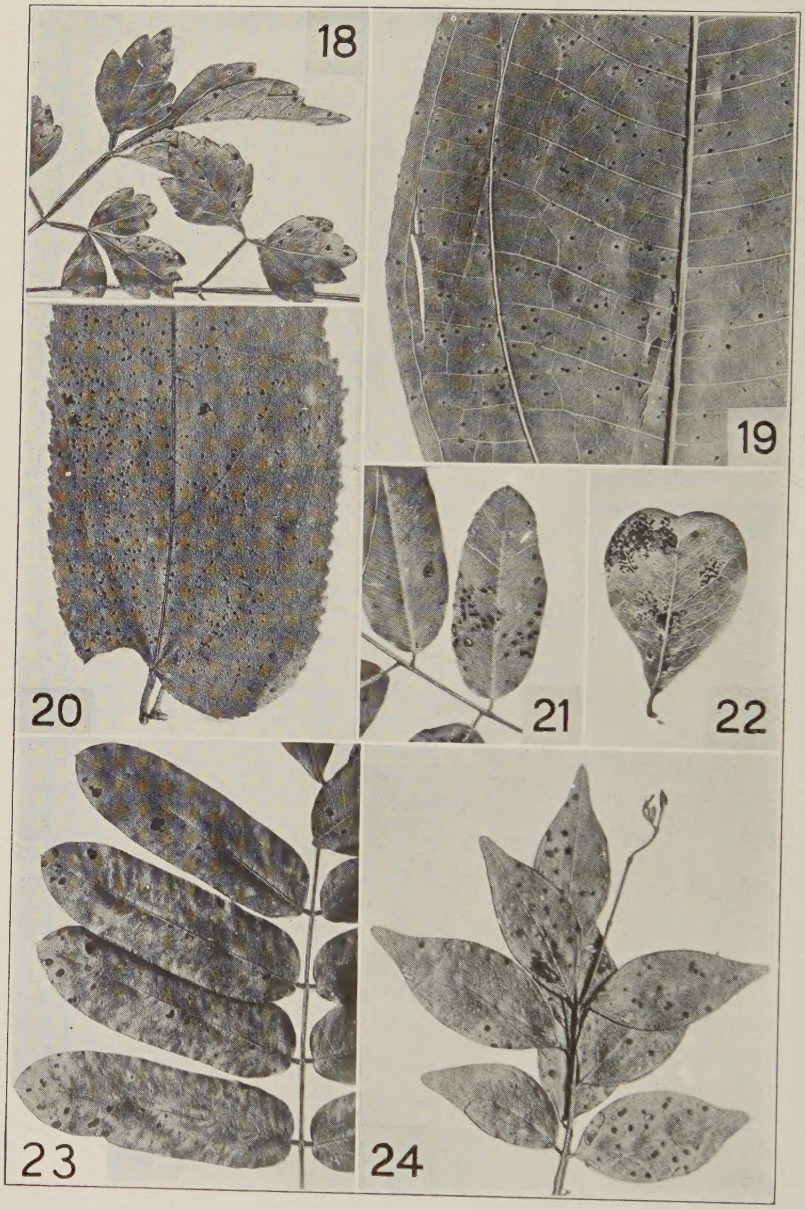
Fig. 24. *Phyllachora Whetzelii* sp. nov. Leaves of *Eugenia* sp. with stromata; notice the circular shape of the stromata. × 8/11.




LEMPOSIA




HYPOCREALES AND SPHAERIALES




DOTHIDEALES